Communication Architecture for Dispatching Demand-Response
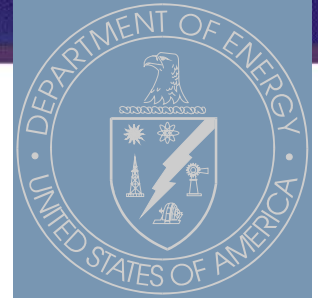
Connected Energy Corp.

Demand-Response
R&D Symposium
November 30, 2004

Topics

- DOE ACCP Project Background
- ACCP Architecture Overview
- PIER extension for Dispatching Demand Response that can be used for Ancillary Services

ACCP Background

- ## DOE OETD FY03 Award for Phase 1
  - Proof of design for aggregation at many 10s kW
  - Period of Performance: June-Dec 2003, Completion Feb 2004
  - 20% cost share minimum
  - 5 Awards: Alstom; Connected Energy Corp.; Detroit Edison; Energy Works; Nxegen, Inc.

- ## Down-Selection Made for Phase II
  - Commercialization and demonstration involving >10 DER units for >1 MW
  - Feeder Connected DERs; ISO involvement
  - 3 awards made: Detroit Edison, Ariva (Alstom), Connected Energy
  - < 2-year period of performance each
  - 50% cost share minimum

DOE Solicitation Objective

"Design, demonstrate and commercialize an advanced DER Communication and Control System capable of seamless integration of large-scale DER installations."

PROPOSAL:
AGGREGATION THROUGH SEAMLESS INTEROPERABILITY

ACCP Project Team

TEAM LEADER: Connected Energy

California
- SCE- demonstration sites
- CAISO
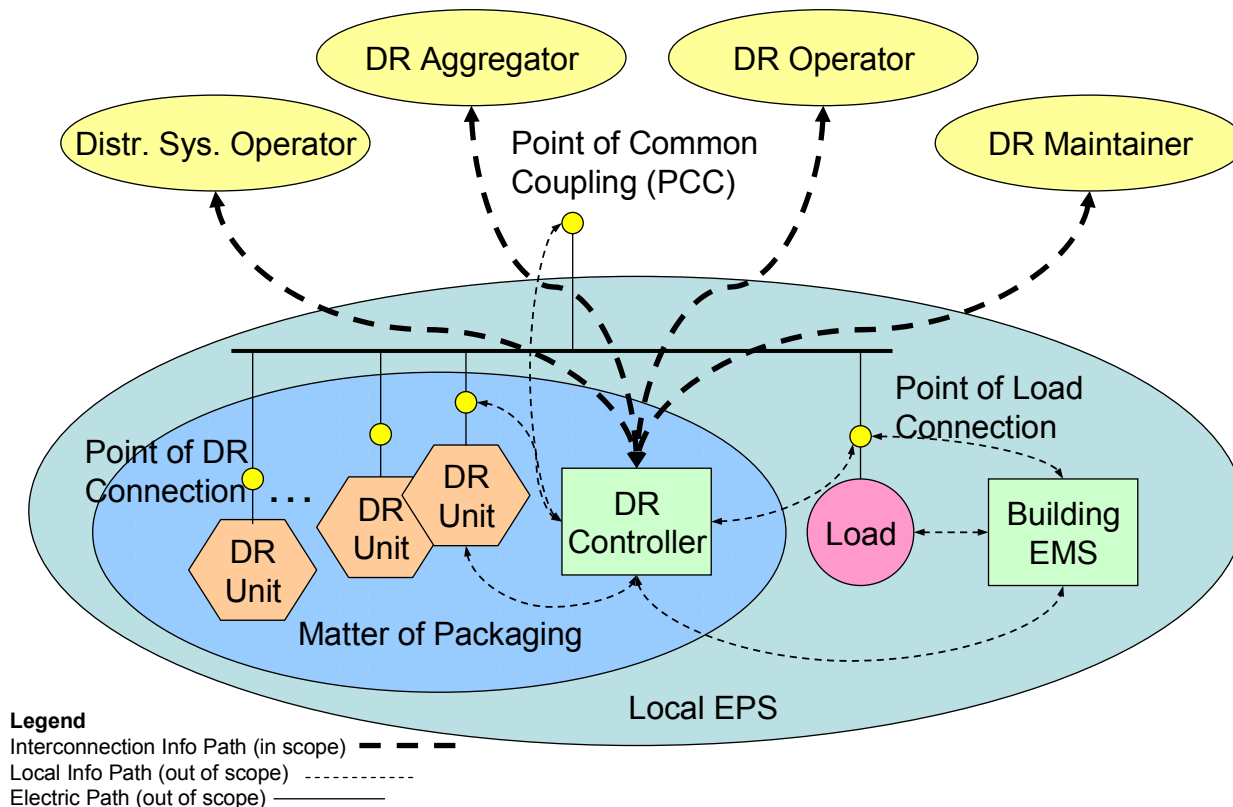- California Energy Commission PIER Program

New York
- Long Island Power Authority - demonstration sites
- NYISO
- NY State Energy Research Development Authority - demonstration sites

Other Participants
- Sandia National Laboratory- Information and SCADA security
- Mykotronx- Cryptography and Cypher modules
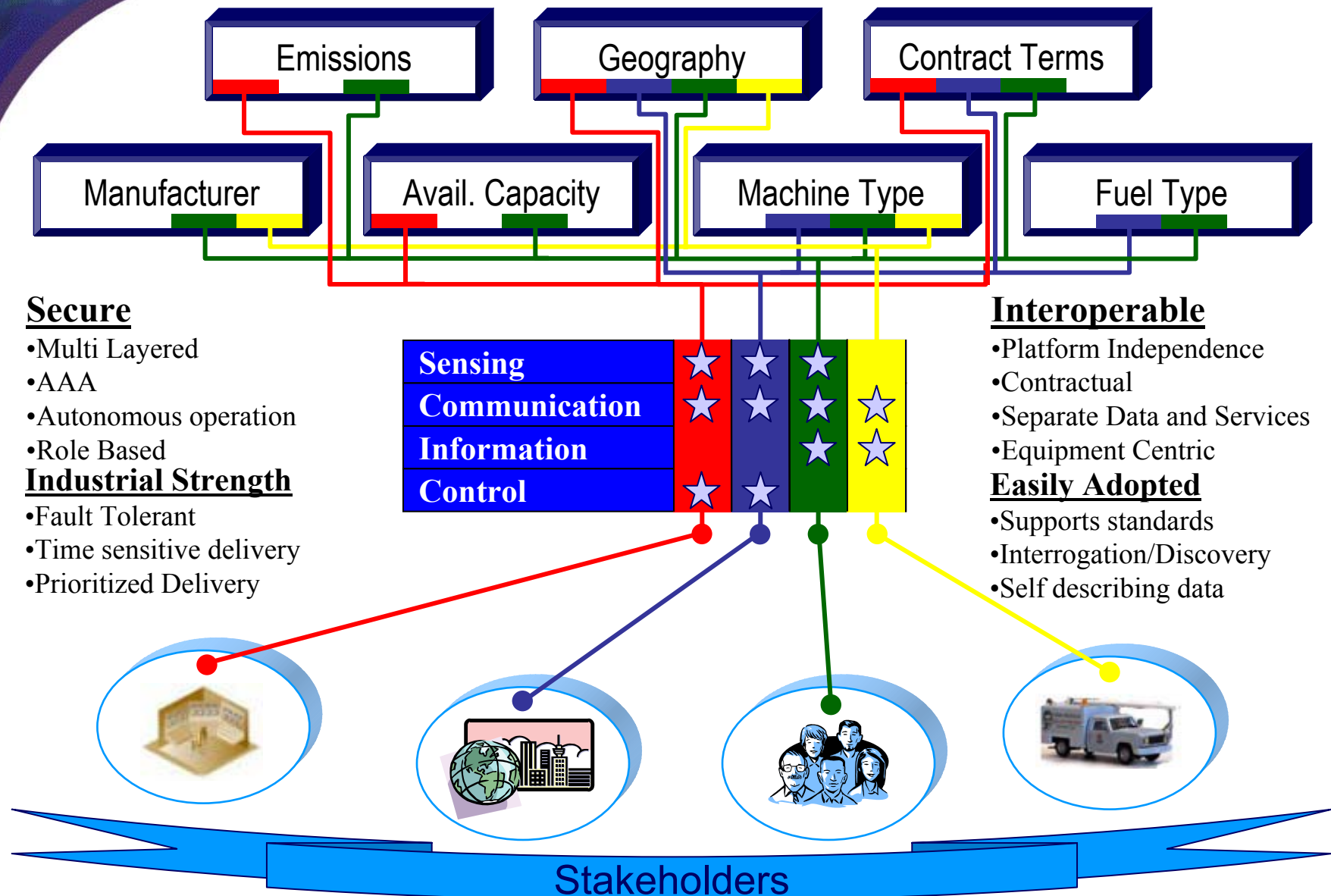- Gas Technology Institute- AGA Security Standard

The Problem Domain

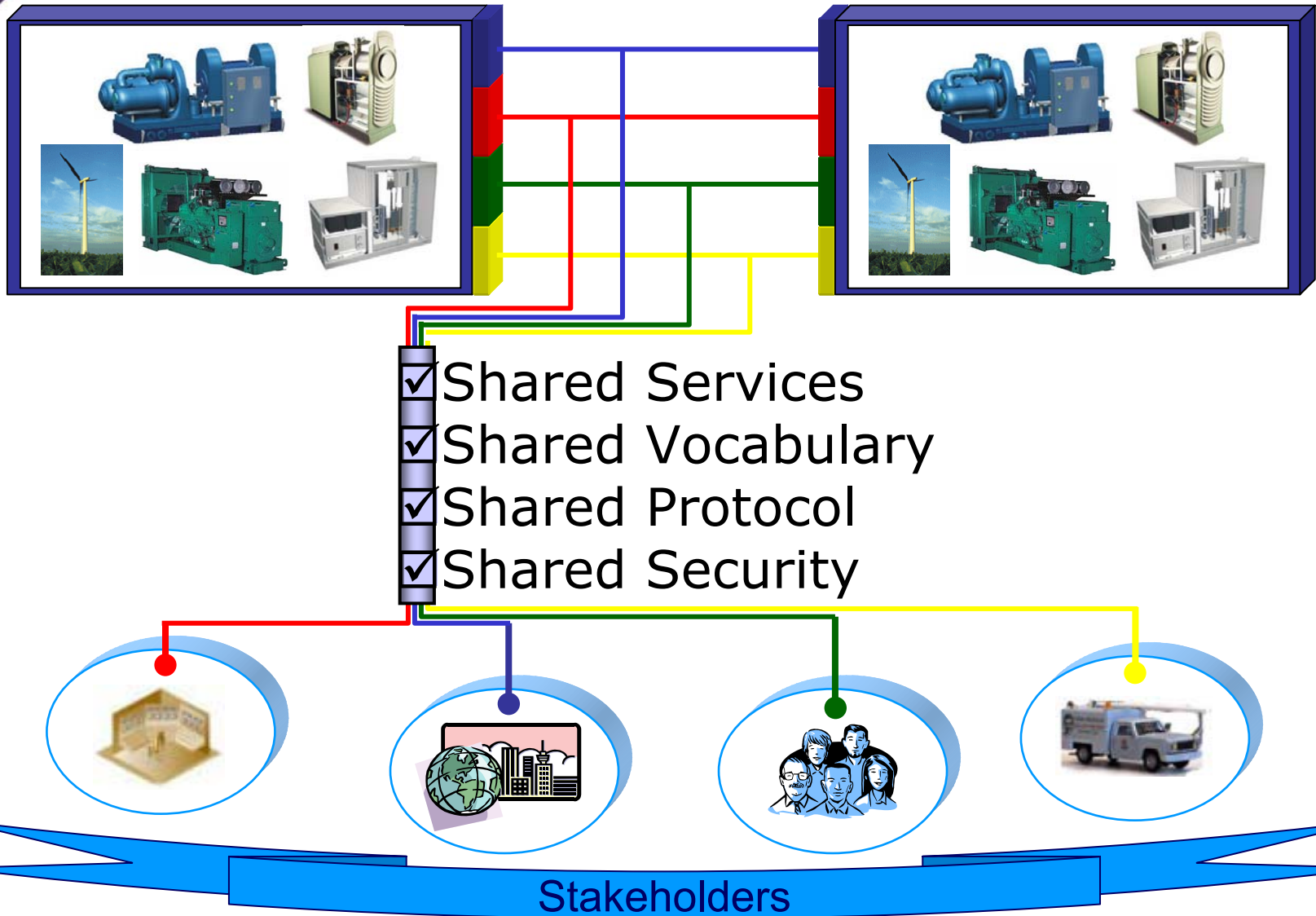The DER domain is highly heterogeneous, fragmented, multi-player, legacy-driven and endlessly configurable.

*From *Draft#1 IEEE P1547.3* document

Project's ACCP Vision

Emissions

Geography

Contract Terms

Manufacturer

Avail. Capacity

Machine Type

Fuel Type

Secure
- Multi Layered
- AAA
- Autonomous operation
- Role Based

Industrial Strength
- Fault Tolerant
- Time sensitive delivery
- Prioritized Delivery

Sensing	★	★	★	
Communication	★	★	★	★
Information			★	★
Control	★	★		

Interoperable
- Platform Independence
- Contractual
- Separate Data and Services
- Equipment Centric

Easily Adopted
- Supports standards
- Interrogation/Discovery
- Self describing data

Stakeholders

How to Achieve Interoperability?

- ☑ Shared Services
- ☑ Shared Vocabulary
- ☑ Shared Protocol
- ☑ Shared Security

Stakeholders

Major Tasks

	Identify Phase 1 Shortfall	Revise Architecture	Define Business Rules	Implementation	Commercialization
Security					
Communications & Registry					
Market Participation					
Demonstration Sites					

18 months
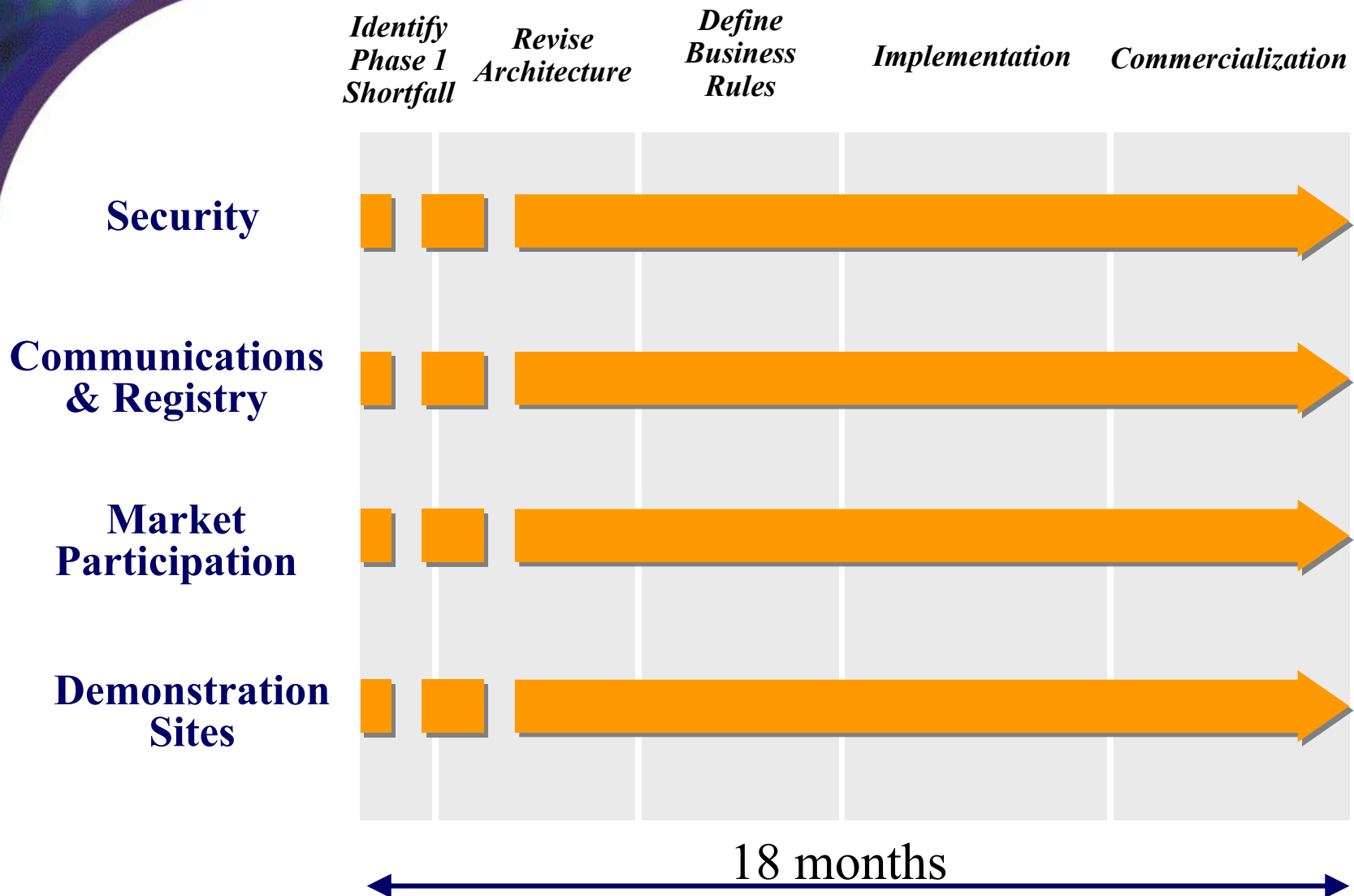
ACCP Demonstration Sites
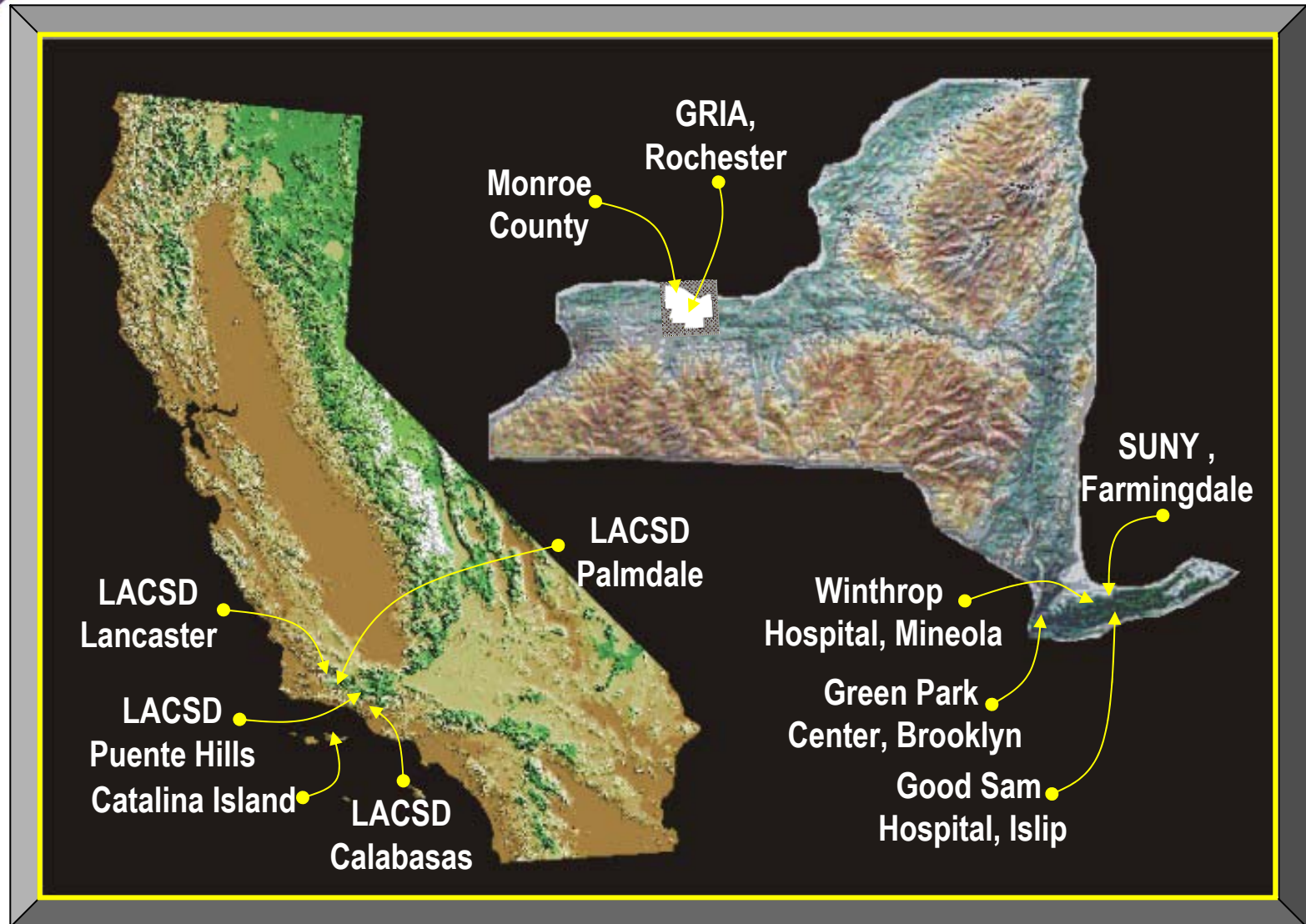
PIER-Demand Response Project - Scope

- Demonstrate use of Demand Response (DR) to provide:
  - Load reduction on heavily loaded feeders
  - Reliability services for ISO
- Responsive Loads: 2 SCE DR systems
  - Planned: 200 Air Conditioner Controllers = 200KW of load
  - Planned: 4000 Smart thermostats = 350KW of load
- Add DR control and monitoring capabilities using the ACCP infrastructure

PIER Demand Response Project - Organization

- **Sponsor:**   CEC PIER Program
                          Laurie ten Hope

- **Coordinators:**   Joe Eto, LBNL/CERTS
                          Dave Hawkins, CAISO

- **Technical Leads:**   Brendan Kirby, ORNL
                          John Kueck, ORNL
                          Bob Yinger, SCE
                          Mark Martinez, SCE
                          Thomas Yeh, Connected Energy
                          Dave Watson, LBNL

- **TAC:**   CAISO, CEC, LBNL, PG&E,
                          SDG&E, SCE

Project Details

- Design experiments using SCE DR programs as Spinning Reserve
- Modify SCE DR system to dispatch by feeder
- Link ACCP System to SCE DR systems for monitoring
- Link SCE SCADA data from feeders to ACCP Data Historian for analysis
- Verify load drop duration and magnitude on selected circuits using Spot Meters
- Work with CAISO and SCE dispatchers to verify that program meets their needs

Project Phases

- ## Phase I (Oct – Jan 2005)
  - Determine sample size needed
  - Prepare test plan
  - Modify demand response dispatch system
  - Obtain data from SCADA system
  - Modify ACCP System to present DR information
- ## Phase II (Jan – May 2005)
  - Install equipment for DR and verification
- ## Phase III (May – Dec 2005)
  - Perform tests of DR system